

Ict Mediated Smart Agriculture: An E-Revolution



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Abstract

Information and Communication Technology (ICT) is a great revolution in farming community of India in respect of the dissemination of information about Agriculture issues related to production, protection including market linkages. For agriculture, the potential of information & communication technology (IT) can be discussed broadly two dimensions viz. direct and indirect contribution to farm productivity. The precision farming or smart agriculture is the result of direct contribution of agriculture technology for farm productivity. While the capacity building of agro-based rural communities through cyber extension with the use of ICT will create opportunities of growth and prosperity by providing chances to agricultural markets for creating a more efficient information and knowledge network in Indian condition. This paper highlights the utilization of ICT for building capacities of agricultural markets through cyber extension. ICT may be treated as the future of Indian Agro economy; if it needs to be all round success more, whereas, more initiatives need to be taken for working in grass root level. With the spreading of ICT, adult literacy (for the farmers, by spreading non-formal education) should be the focus for its successful adaptation to achieve the goal of doubling farmer's income.

Keywords: ICT, Smart Agriculture, Information Technology, E-Governance And Technology Dissemination.

Introduction

The Doubling Farmers' Income (DFI) Committee recognizes agriculture as a value led enterprise and suggests empowering farmers with "improved market linkages" and enabling "self-sustainable models" as the basis for continued income growth for farmers. This builds the basic strategy direction for four primary concerns: optimal monetization of farmers' produce, sustainability of production, improved resource use efficiency and re-strengthening of extension and knowledge based services (Anonymous, 2018).

In the field of agriculture, the potential of information and communication technology (IT) can be discussed broadly two ways viz. direct and indirect contribution to farming related issues in respect of productivity. It could be interpreted that the precision farming as component of smart agriculture is the result of direct contribution of agriculture technology for the issues related to the enhanced farm productivity.

The indirect tools help farmers to take informed and quality decisions which will have positive impact on the way agriculture and allied activities are conducted. Indian farmer urgently requires timely and reliable sources of information inputs for taking decisions. At present, the farmer depends on trickling down of decision inputs from conventional sources which are slow and unreliable. The changing environment faced by Indian farmers makes information not merely useful, but necessary to remain competitive (Anonymous, 2014^a).

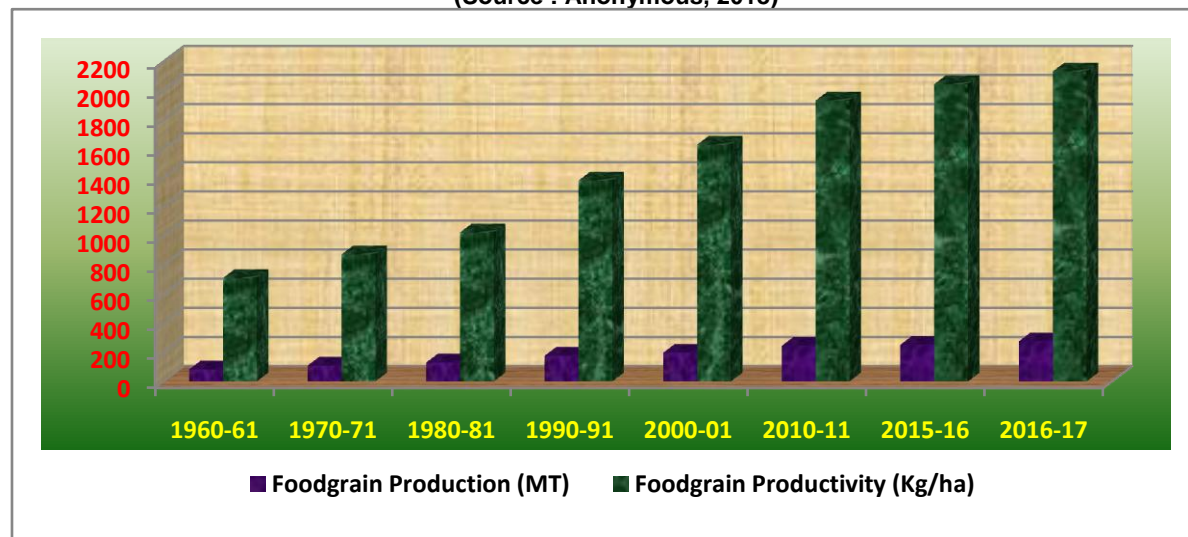
The principle ICT tools especially for the agricultural sector includes personal computers/laptops, mobiles and other telecommunication devices. ICT has various potential applications in spreading the information via techniques used in agricultural extension which may bring revolution tool as new information services to farming community of rural India. A available sets of ICT tools may be applied to tackle the challenges in agricultural development through information dissemination in the following ways:

1. Information related to Agriculture issues
2. Awareness and Education of target group viz., farmers, marketing personnel etc.,

Table 1: Production and Productivity hike of food grains in India (1960-2017)

| Year | 1960-61 | 1970-71 | 1980-81 | 1990-91 | 2000-01 | 2010-11 | 2015-16 | 2016-17 |
|--|---------|---------|---------|---------|---------|---------|---------|---------|
| Food-grain Production (MT) | 82.02 | 108.42 | 129.59 | 176.39 | 196.81 | 244.49 | 251.57 | 275.11 |
| Food-grain Productivity (Kg/ha) | 710 | 872 | 1023 | 1380 | 1626 | 1930 | 2042 | 2129 |

(Source : Anonymus, 2018)

**Fig. 2: Trends of Production and Productivity increase of food grains in India (1960-2017)****History of ICT in India**

Information Technology sector has helped transform India's image to a global IT player and been a driver of the field of higher education. The IT industry is predicted to achieve the target to reach revenue of USD 225 billion in 2020 (Anonymus, 2014^b). The IT sector contributed with 8% of the GDP in India, a significant increase from 1, 2% in 1998. India is a key player in the global ICT world (Anonymus, 2014^b) as the India's total IT industry (including hardware) share in the global market stands at 9%. In the Information Technology segment the share is of 6% while in the ICTs space the share is 2%. In 2012-13, it is estimated that IT exports reached 75 billion which was a 10% increase (Kanika Singla, 2018).

The growth of ICT sector helps in growth of GDP in India, the form of exports and imports of agriculture commodities its helps to rural farmers about the current price of near market and farmers have option about the price on which farmers easily they can compare the price of different Mandi. There is some challenges which is affecting to ICT in farming during the poor networking and some individual problem which farmers was facing like no electricity poor connectivity with Telecom Company these are the major problems which affects the steps of ICT in India.

ICT is big step which has been taken by the our government, where farmers are getting basic information, and as all though some other sector is developing drastically and our agriculture sector how it could be the last in 21st century. There are major challenges or risk is involved in this term but it would be good for future of Indian Farmers.

According to Eleventh Plan, the agricultural strategy for has pointed out that the availability of land

and water fixed, the goal of 4% growth in agriculture can be achieved only by increasing productivity per unit of scarce natural resources through effective use of improved technology (Anonymus, 2007). As per the policy, it is planned to encourage the alternate delivery channels viz., Rural Knowledge Centres (RKC), ICT-based extension, farmer-to- farmer extension, NGOs and the private sector etc., The scheme viz., 'Mass Media Support to Extension' aims to utilize the impressive infrastructure of Doordarshan (DD) and All India Radio (AIR) for producing and broadcasting agricultural programmes addressing to various agricultural issues which may helpful as a supporting tool for other extension efforts.

The Department of Agriculture and Cooperation, therefore, is in the process of preparing a National e-Governance Plan in Agriculture (NeGP-A) for a more focused implementation of e-governance activities in the agriculture sector. In order to promote e-governance in agriculture at the centre and provide support to states/UTs for the same, the Department of Agriculture and Co- operation is implementing a central sector scheme, "Strengthening/Promoting Agricultural Information Systems" during the Tenth Plan with a budgetary provision of INR 100 crore. The scheme has the following components: (i) Development of agricultural informatics and communication; (ii) Strengthening of IT apparatus in agriculture and cooperation in states and UTs(AGRISNET); (iii) IT apparatus at Department headquarters and its field offices; (iv) Agricultural Resources Information Systems (AgRIS); and (v) Kisan Call Centres. The Department has developed four portals and 40 websites covering both headquarters and its sub-formations under the component "Development of Agricultural Informatics and Communications". Some important portals which

has till now been developed are: (a) AGMARKNET Portal (<http://agmarknet.nic.in>); (b) DACNET Portal (<http://dacnet.nic.in>); (c) DAC Portal (<http://agricoop.nic.in>); (d) IN-TRADAC Portal (<http://intradac.nic.in>); (e) SEEDNET Portal (<http://seednet.gov.in>); (f) Agricultural Census Portal (<http://agcensus.nic.in>). The Department of Agriculture and Cooperation is supporting e-governance activities at the state agriculture and allied departments through AGRISNET, a state sector mission mode project, which aims at providing improved services to the farming community using Information and Communication Technology (ICT). Agricultural Resources Information System (AgRIS) project has been launched for implementation in two pilot districts of Rohtak (Dairy Typology) in Haryana and Banaskantha (Arid Typology) in Gujarat. Kisan Call Centers initiative aims to provide information to the farming community through toll-free telephone lines. Usage of GIS satellite imaging in India had been happening since a long time in IndiICT technologies can help for strengthening farming communities through wide networking and collaborations with various institutes, NGO's and private sectors. Further, farmers may enhance their own capacities through updated information and wide exposure to scientific, farming and trade community.

There is great transformation in Indian agriculture owing to changes in the economic and trade environment. To cope up with these changes timely, relevant and accurate information to the farmers and other stakeholders will help them take optimum decisions (Shalendra et al, 2011)

ICT-Initiatives by Indian Government for Agriculture

Approximately 45 per cent ICT projects of the whole world have been implemented in India and also maximum number of information kiosks has been employed in rural India (Manzar, 2004). Nevertheless, it was found that majority of the ICT projects in agriculture were put into action in socio- economically developed states of South and North India (Paul et al, 2004), while deprived states are not benefitted by ICT initiatives. The rural India is lagging no way behind in adopting the usage of ICT tools. Mobile phones, TV sets, radios why even computers and laptops are entering their scaffolds in fervent pace (Swaminathan and Chellappan, 2013) Some of the e-Agriculture initiatives in India are indicated below (Surabhi Singh et al, 2017).

Agrisnet

A comprehensive web portal to broadcast relevant information to farmers, which was Endeavour initiated and funded by the Ministry of Agriculture, Government of India. The AGRISNET serves farming community by disseminating information and providing services through use of Information & Communication Technology (ICT). It provides the information regarding-

1. Quality Inputs and its availability
2. Various Government schemes
3. Various agricultural package and practices viz., recommendation of fertilizer doses after soil testing

4. Latest technologies for increasing productivity in agriculture.

Digital green

The digital tool i.e. Digital Green is an international organization, working on digital platform with the aim of participatory approach by engaging rural community to improve their livelihood. Interactive, self explanatory videos are prepared concentrating the requirements and welfare of the rural masses.

eSagu

In 2004, the eSagu system was developed, which provides customized solution to the farmers' problems along with package of advice from stage of sowing to harvesting. Its interactive platform where the farmers send their farm condition in the form of digital photographs and videos, which were analyzed by the agricultural scientists and experts and reciprocating with their expertise suggestion. The expert advice is conveyed to the concerned farmer within short time.

IKSL

IFFCO KISAN SANCHAR LTD (IFFCO Kisan) was started in 2012 with an objective to develop the system which delivers relevant information and custom-made solutions to the concerned farmers through voice messages on mobile phones. The special phone-in programs are organized wherein the farmers can also communicate directly to the agricultural experts.

Agmarknet

The venture of Ministry of Agriculture, Government of India in form of Agricultural Marketing Information Network (AGMARKNET) was commenced in March, 2000, aiming towards the empowering decision-making ability of the farmers regarding selling of their produce. It is a digital portal, developed to pace up the agricultural marketing system through broadcasting information about influx of agricultural commodities in the market and their prices to producers, consumers, traders, and policy makers with total transparently and time efficiency.

[6] Digital Mandi : The e-trading platform i.e. Digital Mandi is efficiently facilitating farmers and traders to sell and procure agricultural produce beyond the limitations of the geographical and temporal limitations effortlessly.

eArik

In year 2007, the eArik project was launched to disseminate climate smart agricultural practices and to achieve food security thereof. The eArik is an integrated platform useful for enhancing the accessibility of agricultural information and technology especially focused in north-eastern India. Through this platform, the delivery of advice given by agricultural specialist in respect of crop cultivation, crop management and marketing.

Akashganaga

Akashganga is ICT project targeting to dairy sector. It makes facilities easier for the milk collection, fat testing, and payment with advantages of time and user friendly system.

AAQUA (Almost All Questions Answered)

Almost All Questions Answered i.e. aAQUA is a efficient multilingual online system, facilitating the Indian farmers by advising, solving their problems and answering their questions related to agriculture in multiple languages. For using this system, the farmers have to register on aAQUA platform online or telephonically.

Fisher Friend Mobile Advisory KCC

M S Swaminathan Research Foundation was launched the Fisher Friend Programme (FFP) of in 2009 with objective to protect fisher folk from occupational hazards and to empower their livelihoods. The information regarding the wave height, wind speed and direction, potential fishing zones, relevant news, government schemes and market price is provided to fishermen in local language. It focuses on coastal communities of Tamil Nadu, Puducherry, Andhra Pradesh, Kerala, and Odisha, and it is found to be more effective as it is operational in English, Tamil, Telugu, Malayalam, Odiya languages.

SMS Portal/mKisan Portal

The SMS Portal or mKisan Portal is designed aiming to serve farmers through dissemination information about diverse agricultural activities, seasonal advisories and various services directly to farmers through SMSs in their local/regional languages under different sectors viz., agriculture, horticulture, animal husbandry and fisheries.

[12] Mahindara Kisan Mitra : The Mahindra Kisan Mitra is a portal providing the information in respect of prices of commodities, weather forecast, crop advisories, loans, insurance, cold storage and warehouses along with success stories of progressive farmers.

Kisan Call Centers (KCCs)

The Department of Agricultural and Co-operation launched the KCCs in 2004 with the main intention of endowing extension services to the farming community in the local languages. Through this system, the issues of farmers are tackled by agricultural graduates on help line, toll free number in their local language. Beside this the agricultural scientists also visit the field in person to resolve the complex agricultural problems.

Village Knowledge Centers (VKCs)

In 1998, MS Swaminathan Research Foundation initiated the Village knowledge centers in Pondicherry to provide a gateway of technical information related to agricultural inputs, price of outputs, crop rotation, use of fertilizers and pesticides through public address system.

[15] Agronxt: The multitasking platform named 'AgroNxt' has been useful for the farmers to provide information regarding basic needs of agriculture viz., inputs, agriculture advice, weather condition etc. which ultimately assists to enhance the agricultural productivity and sustainability through delivering farmers usable, reliable and timely information that maximizes farm profitability.

Advantages of ICT in Agriculture

ICT has revolutionaries the Indian Agriculture. Increased agricultural productivity and

strengthening the Agricultural sector include timely and updated information on agriculture related issues such as new varieties release, emergence of new threats such as diseases, weather forecast, pricing control, warning alerts etc can be credited to effective ICT system. ICT is an electronic means for processing and dissemination of information or in other words it's an umbrella including range of communication devices or application viz., radio, television, mobile, landline phones, computer/laptop and network hardware and software, satellite systems and video conferencing useful for the delivery of information in the form of audio, data, video and image etc (Mishra, 2019).

Some of the advantages of Information and Communication technologies (ICT) in agriculture are as follows:

1. Avenue for new agricultural and rural business.
2. Analytical Support System for optimum farm production, disaster management, agro-environmental resource management etc.,
3. Improve the farm management and farming technologies
4. System to secure food traceability and dependableness that has been a rising issue regarding farm product
5. System for providing the Up-to-date market information on prices for commodities, inputs and consumer trends.
6. Empowers the Stakeholders (Government officers, Research, Education & Extension Scientists, farmers and different service suppliers like Community data centers.
7. Helpful for development of information Management, call Support and consolatory Systems to strengthen Extension services and additionally used for Farmers Redressal system.
8. Facilitates the efficient management (Development, Conservation, allocation and utilization) of resources.
9. Beneficial system through improved productivity and profit of farmers through higher consolatory systems

Conclusion

India has at least two decade long experience of using ICT in agriculture. ICTs have gone through different stages and many of these will continue to evolve in response to changing technology and business environment in agriculture as well as in response to emerging challenges in agriculture. Agriculture is one of the indispensable sectors in our country. It is well known fact that ICT can revolutionize agriculture in many ways. ICT projects are yet to make any breakthrough in agricultural information dissemination and other areas. Deployment of ICTs needs to be stressed more. ICT for agricultural projects needs to be compared and evaluated precisely. It is need of hour to obtain apposite information through ICTs and to deploy advanced ICTs in agriculture.

It can be concluded that, the ICT has emerged as a decision support system for the Indian farmers. Farmers may be updated with the recent information about agricultural inputs, weather

condition, planting schedules, new varieties/cultivars of crops of interest along with the innovative tips and technologies for increasing production with quality. The timely approach of adequate, efficient and tailored technologies to the rural farmers is deficient in Indian agriculture and it is the real challenge in front of policy makers in India. ICT can fill up the gap between technology/information hub and its real application site i.e. farm to achieve the comprehensive goal of doubling of Indian farmer income through smart agriculture.

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